On Telescoping

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1 The Problem

The phenomenon we discuss is illustrated by the contrast in (1)-(8) (we use coindexing to indicate intuitive binding):

(1) ??Every dog$_i$ came in. It$_i$ lay down under the table.

(2) *If every cat$_i$ purrs, it$_i$ is happy.

(3) *If John owes every man$_i$ money then Sam pays him$_i$. [Hornstein, 1984]

(4) *John likes every dog$_i$ and Sam feeds it$_i$. [Hornstein, 1984]

(5) Every story$_i$ pleases these children. If it$_i$ is about animals, they are excited, if it$_i$ is about witches, they are enchanted, and if it$_i$ is about humans, they never want me to stop. [Belvadi, 1989]

(6) Each degree candidate$_i$ walked to the stage. He$_i$ took his diploma from the dean and returned to his$_i$ seat. (Partee, from [Roberts, 1987])

(7) Each student$_i$ in the syntax class was accused of cheating on the exam and he$_i$ was reprimanded by the dean. [Fodor and Sag, 1982]

(8) Each candidate$_i$ for the space mission meets all our requirements. He$_i$ has a Ph.D. in Astrophysics and extensive prior flight experience. [Roberts, 1987]

Data of the type in (1)-(4) led Heim ([Heim, 1982], p.204) to assume the *Scope Constraint*: quantifiers cannot take scope beyond the clause in which they appear at S-structure. Yet, (5)-(8) involve an occurrence of a singular pronoun which is in some sense anaphorically related to a universal quantifier in the previous sentence. Roberts [1987] called this phenomenon *telescoping*.

2 DRT, DMG, and Telescoping

In the Kamp/Heim approach, (i) quantifiers are unable to bind variables outside their scope at S-structure, (ii) indefinite NP's have no quantificational power of their own, and (iii) provisions for default existential quantification of free variables account for the ability of indefinites to be anaphorically related to pronouns outside their scope. In this approach, the intuitive bindings in

(1)-(4) are correctly ruled out by (i). The data in (5)-(8), on the other hand, are unaccounted for.

In Groenendjik and Stokhof's Dynamic Montague Grammar (DMG), indefinites are existential quantifiers. Their ability to enter in anaphoric relations with pronouns outside their scope is accounted for by assuming that existential quantifiers are able to bind variables outside their scope. This means that (i) is false in DMG. Thus, (5)-(8) are naturally analyzed in DMG as instances of variable binding. For example, using the dynamic version of the universal quantifier, (9) would be translated as (10), which is equivalent to (11).

(9) Each degree$_i$ candidate walked to the stage. He$_i$ took his$_i$ diploma from the dean.

(10) $\mathcal{A}d_i$[degree-candidate(d_i) $\Rightarrow$ walked-to-the-stage(d_i)]; took-his-diploma-from-the-dean(d_i)

(11) $\mathcal{A}d_i$[degree-candidate(d_i) $\Rightarrow$ [walked-to-the-stage(d_i); took-his-diploma-from-the-dean(d_i)]]

In this analysis, however, (1)-(4) are problematic, since we might expect the universal quantifier to be able to bind the pronoun.

3 Towards an Account of Telescoping

What we want to do at this point is to present the main features of the account of telescoping we have in mind, so that you know where we are heading. Then, we'll pursue various aspects of the account in more detail.

Roberts [1989] suggested an analysis of the data in (5)-(8) which is compatible with the scope constraint. In this analysis, for example, (6) undergoes an accommodation process whose outcome is that the second sentence in (6) is represented as a tripartite structure whose restrictor has been reconstructed as in (12′):

(12) He$_i$ took his diploma from the dean and returned to his$_i$ seat.

(12′) $\boxed{\begin{array}{l} x \\ \text{DEGREE-CANDIDATE}(x) \end{array}} \longrightarrow \boxed{\begin{array}{l} \\ \text{TOOK-HIS-DIPLOMA-FROM}(x, d) \\ \ldots \end{array}}$

However, neither Roberts nor Groenendjik and Stokhof address in a systematic way why the contrast in (1)-(8) arises. We will argue that the analysis of telescoping in terms of Roberts' restrictor reconstruction approach is preferable to the variable binding approach. We suggest that reconstruction of the restrictor is subject to the following necessary licensing condition:

Licensing Condition for Restrictor Reconstruction

> Given a sentence S, reconstruction of a restrictor for S is possible only if the discourse makes it clear that S is to be interpreted relative to a restrictor.

The task we face in suggesting this condition is obviously that of explaining what "make clear" means. We suggest that there are two basic ways in which the discourse can make it clear that S is to be interpreted relative to a restrictor. One way, which Roberts also pointed out, is given in A:

A. The discourse can make it clear that a sentence S is to be interpreted relative to a restrictor by explicitly indicating via syntactic means the presence of an operator which takes a restrictor and a nuclear scope.

For example, the presence of an if-then structure is an explicit indication of the presence of a restrictor. Thus, (5) is an instance of A:

(5) Every story$_i$ pleases these children. If it$_i$ is about animals, they are excited, if it$_i$ is about witches, they are enchanted, and if it$_i$ is about humans, they never want me to stop. (Belvadi)

Assuming that the generic operator is an operator on tripartite structures (see, e.g., [Heim, 1982; Carlson, 1987; Krifka, 1992]) instances of telescoping with generic sentences like (13) also fall under A. The constrast in (14), pointed out to us by Geoff Nunberg, shows again how the possibility of a generic reading, licensed by the bare NP "ostracism" in (14a), licenses telescoping.

(13) Every Italian$_i$ loves his$_i$ mother. He$_i$ adores her.

(14) a. Every male Athenian citizen$_i$ voted on ostracism. He wrote the name of the candidate on a piece of pottery.

b. Every male Athenian citizen$_i$ voted on the ostracism. ??He wrote the name of the candidate on a piece of pottery.

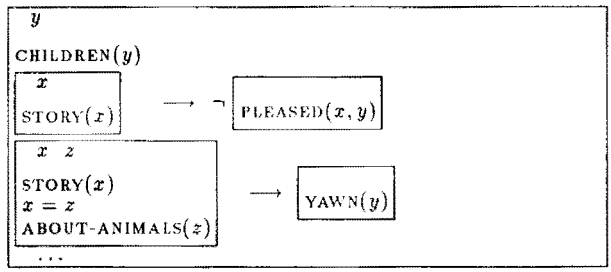
(15) is also an instance of A:

(15) No story$_i$ pleases these children. If it$_i$ is about animals they yawn, if it$_i$ is about witches they frown. If it$_i$ is about people they fall asleep.

Assuming that downward monotonic quantifiers like 'no' can be represented in DRT as in (16), the accommodation of the missing antecedent would yield representation (15'), which assigns correct truth-conditions to (15):

(16) $\boxed{\begin{array}{c} x \\ \hline \mathbf{P}(x) \end{array}} \longrightarrow \neg \boxed{\mathbf{Q}(x)}$

(15′)



The other way in which the discourse can make it clear that S is to be interpreted relative to a restrictor is B:

B. The discourse can make it clear that a sentence S is to be interpreted relative to a restrictor by providing contextual information which links S to a restrictor.

In order to illustrate the meaning of B, let's observe that by making it clear that the events described are part of a script in which every member of a contextually-given group instantiates a certain property, telescoping becomes possible even when at first sight it was not. Consider (1) again:

(1) ??Every dog$_i$ came in. It$_i$ lay down under the table.

Now, read (1) in the context provided by (17):

(17) I went to the circus last night. They had a number involving dogs that went like this: The circus performers put a table on some supports. Then, every dog came in. It lay down under the table, stood on its back paws, and lifted the table with its front paws.

In this context, (1) becomes marginally acceptable. In cases such as the sequence of events described by (6), the script may be already known to the reader: it is common knowledge that in graduation ceremonies a certain routine is performed by all degree candidates. We suggest that it is this contextually-given knowledge that makes it possible to recover a restrictor for the telescoped sentence:

> A context c may link S to a restrictor $[\alpha]$ only if $[\alpha] \Rightarrow S$ is a step of a script salient in c.

Notice that looking at telescoping as restrictor reconstruction leads one to expect that telescoping of a pronoun in a simple sentence should be subject to a constraint of the type above. If the presence of a restrictor for S is not explicitly indicated by the syntax, the tripartite structure itself needs to be reconstructed together with an appropriate content for the restrictor. And it seems plausible to assume that structure-building operations of this sort at the discourse level are allowed only when the context gives a very clear

indication that the simple sentence is to be interpreted relative to a restrictor. On the other hand, the variable binding approach yields no account of why telescoping of a pronoun in a simple sentence should be constrained as it is, since, in this approach, whether the pronoun occurs in a tripartite structure or not makes no difference to the ability of the universal quantifier in the previous sentence to bind the pronoun.

This concludes the intuitive sketch of the proposal. Now, we turn to pursuing it in more detail. First, we discuss the instances of telescoping in which the presence of a restrictor is syntactically signalled, and then those instances of telescoping that involve reconstructing the structure.

4 Reconstructing the Content of the Restrictor

The Nature of the Reconstruction Process

There are different ways in which one might think of the process of reconstructing the content of the restrictor in telescoping examples like (5):

(5) Every story$_i$ pleased the children. If it$_i$ was about animals, they were excited, if it$_i$ was about witches, they were enchanted, and if it$_i$ was about humans, they never wanted me to stop.

One way is to look at it as a purely pragmatic process in which contextually salient material is inserted into the restrictor. In this purely pragmatic approach,

(i) considerations of plausibility and consistency may determine what gets filled in the restrictor;

(ii) what material gets accommodated in the restrictor is not constrained by the semantic structure of the preceding discourse, unless this structure can be maintained to affect the saliency of the descriptive material considered for accommodation;

(iii) no formal relation is assumed between the telescoped pronoun and the NP to which the pronoun is intuitively related.

But views of the reconstruction process which do not assume (i)-(iii) are also possible. For example, one could reject (iii) and maintain that

(iv) the pronoun and its intuitive antecedent are formally related, but this formal relation is not semantically realized as variable binding.

(One needs to add the "but" if (iv) is not to be collapsed with the variable binding view.) Or one might reject (ii) and claim that

(v) the semantic structure of the preceding discourse plays a role beyond affecting saliency in constraining accommodation.

Mixed views are also possible. One could maintain (iv) or (v) and make room for (i) as well. Which view is correct?

In the examples of telescoping considered so far, in which the tripartite structure is explicitly indicated, the accommodated material seems to come from the universally quantified NP which we intuitively perceive as the antecedent of the pronoun (AR = intuitively accommodated restrictor):

(5) Every story$_i$ pleases these children. If it$_i$ is about animals, they are excited, if it$_i$ is about witches, they are enchanted, and if it$_i$ is about humans, they never want me to stop.
AR: [x is a story]

(13) Every Italian$_i$ loves his$_i$ mother. He$_i$ adores her.
AR: [x is an Italian]

(15) No story$_i$ pleases these children. If it$_i$ is about animals they yawn, if it$_i$ is about witches they frown. If it$_i$ is about people they fall asleep.
AR: [x is a story]

But this is no evidence that telescoping requires us to assume that there is a formal relation of some sort between the telescoped pronoun and the universally quantified NP. For example, the fact that only material from the NP is borrowed in (15) may follow from the fact that the first sentence in the discourse has already made clear that the set of stories that please these children is empty. Thus, if we accommodated the antecedent "x is a story that pleases these children" in the second sentence, the conditional would become trivial. For (5), on the other hand, accommodating material from the NP and from the VP rather than from the NP alone would not result in different truth-conditions for the discourse as a whole, since by the time the second sentence is processed, the common ground already contains the information that the set of stories is identical to the set of stories that please these children. A purely pragmatic version of the antecedent reconstruction process, therefore, seems to work fine for the examples of telescoping we have considered so far. Considerations of plausibility dictate what gets filled in the antecedent. Consider, however, examples (18)-(20):

(18) Not every paper$_i$ is written in Italian. If it$_i$ is submitted to an English journal, the editors don't like it$_i$.

(19) Not every paper$_i$ that gets submitted to a journal is a good paper. If it$_i$ is accepted, it$_i$'s a good paper.

(20) Not every paper$_i$ assumes dialectical materialism. If it$_i$ is read at an international conference, the audience doesn't like it$_i$.

Consider sentence (19). In this case, the understood interpretation for the pronoun is "x is a paper submitted to a journal" rather than "x is a paper submitted to a journal which is a good paper." The pragmatic account

of telescoping makes the correct prediction in this case, since the second sentence would become trivial if we copied "x is a paper submitted to a journal which is good paper" into the antecedent box of the second sentence. Consider (18), however. Here, plausibility suggests the antecedent of the telescoped sentence should be filled with "x is a paper written in Italian," since if we copy "x is a paper," we would get a very implausible reading, namely the reading that "if a paper is submitted to an English journal, the editors don't like it." Thus, the pragmatic story predicts that we should understand (18) as saying what (21) says. In fact, (18) cannot get reading (21). English speakers find (18) bad since the only reading available, given in (22), doesn't make much sense.

(21) Not every paper is written in Italian. If x is a paper written in Italian and x is submitted to an English journal, the editors don't like it.

(22) Not every paper is written in Italian. If x is a paper and x is submitted to an English journal, the editors don't like it.

Example (20) makes the same point as (18). Notice, moreover, that the inability of the reconstruction process to collect material from the VP cannot be attributed to the fact that material in the VP is inaccessible for telescoping, since (23) is an acceptable instance of telescoping:

(23) These children like every story$_i$. If it$_i$ is about animals, they are excited, if it$_i$ is about witches, they are enchanted, and if it$_i$ is about humans, they never want me to stop.

What the data in (18)-(23) point at is that a purely pragmatic account of accommodation won't do for telescoping. But what is the full moral we should draw from (18)-(23)?

A Constraint on Accomodation

We suggest C1 as a constraint on accommodation:

C1 *If a discourse marker x is accommodated in a restrictor r, only descriptive material in the minimal box whose universe contains x can be accommodated in r.*

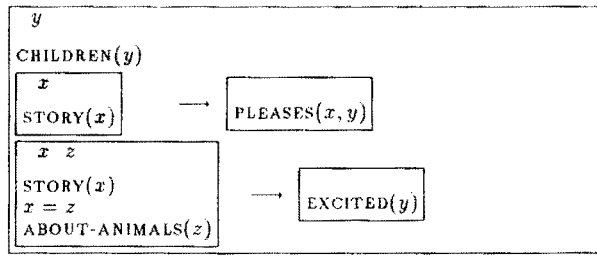
We also assume that accommodation follows P1:

P1 *Accommodate descriptive material from the minimal box containing the accommodated discourse marker up to inconsistency or implausibility*

Let us now return to the instances of telescoping in (5), (13), (15), (18)-(20). The constraints we proposed yield the correct choice of restrictors for these cases. Take (5), for example: the discourse referent accommodated in the corresponding DRS (5') is x, and the only descriptive material in the box whose universe contains x is STORY(x), which is the intuitively correct choice of restrictor (AR = intuitively accommodated restrictor):

(5) Every story$_i$ pleases these children. If it$_i$ is about animals, they are excited, if it$_i$ is about witches, they are enchanted, and if it$_i$ is about humans, they never want me to stop. (AR: [x is a story])

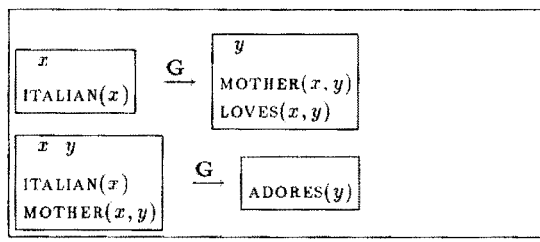
(5′)



Similarly, in the DRS for (13) only the condition ITALIAN(x) can be accommodated for x. The descriptive material accommodated for y is MOTHER(x, y). We don't need to accommodate LOVES(x, y) since the first sentence in the discourse has already told us that every Italian loves his mother.

(13) Every Italian$_i$ loves his$_i$ mother. He$_i$ adores her. (AR: [x is an Italian])

(13′)



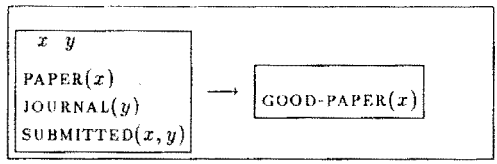
The DRS for the first sentence in (18) is (24):

(18) Not every paper$_i$ is written in Italian. If it$_i$ is submitted to an English journal, the editors don't like it$_i$. (AR: [x is a paper])

(24)

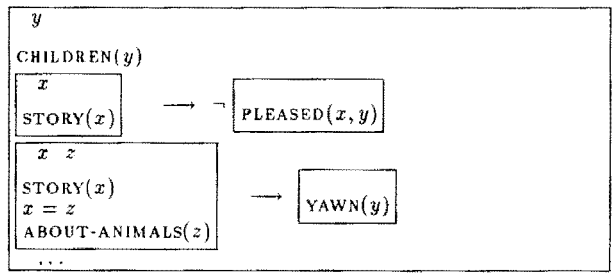
Thus, given C1, only "x is a paper" could be accommodated. However, this would result in an implausible reading of (18). A similar prediction is made for (19). The first sentence in (19) gets represented as (25):

(19) Not every paper$_i$ that gets submitted to a journal is a good paper. If it$_i$ is accepted, it$_i$'s a good paper. (AR: [x is a paper])

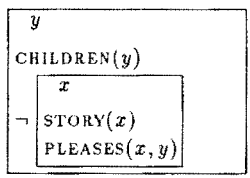
(25) 

Given the constraints above, the whole descriptive material of the antecedent DRS is accommodated in the restrictor of the second sentence. Finally, in the case of (15), the choice of the structure $K_1 \Rightarrow\sim K_2$ for the first sentence in (15) yields representation (15′) in which the accommodated material is STORY(x), since this is the only material in the minimal box containing x.

(15) No story$_i$ pleases these children. If it$_i$ is about animals they yawn, if it$_i$ is about witches they frown. If it$_i$ is about people they fall asleep.
AR: [x is a story]

(15′) 

Moreover, choosing a representation of the form $\sim K$ for the first sentence in (15), as in (26),

(26) 

would still result in the same choice of STORY(x) as the accommodated restrictor, because accommodating PLEASES(x, y) in addition to STORY(x) would make the conditional structure for the second sentence trivial, since the discourse has already informed us that there is no story that pleases these children. (Accommodating only PLEASES(x, y) would make the conditional implausible since the property predicated of the "it" indicates that "it" refers to "stories.")

The constraints above also predict the correct choice of a restrictor for Roberts' example of modal subordination in (13):

(13) A_i wolf might come in. It_i would eat you first.
AR: x is a wolf that comes in

In this case, the DRS for the first sentence in (13) is (27):

(27) $\Diamond$ [x | WOLF(x), COMES-IN(x)]

Thus, all of the descriptive material of the DRS under the scope of the diamond would be carried along. Finally, the constraints above predict the correct choice of a restrictor for the second sentence in (28) (pointed out to us by Makoto Kanazawa):

(28) No man_i can be friends with a $woman_j$ he_i finds attractive. He_i always wants to have sex with her_j. (from "When Harry met Sally")

In (28) the understood antecedent for the second sentence is (29) and not (30):

(29) if x is a man and y is a woman x finds attractive

(30) if x is a man and y is a woman x finds attractive and y is a woman x is friends with

In this case, what prevents the choice of antecedent (30) is that the discourse prior to the utterance of the second sentence in (28) has made it clear that there are no men that can be friends with a woman they find attractive and thus the choice of the antecedent in (29) would result in trivializing the conditional.

According to our proposal then, at least (i) and (v) are needed in order to account for how the accommodation process works:

(i) considerations of plausibility and consistency may determine what gets filled in the restrictor;

(v) the semantic structure of the preceding discourse plays a role in constraining accommodation beyond affecting saliency.

We are not suggesting that C1 and P1 are the only constraints on accommodation. But, in view of the cases we have considered, it seems to us that a purely pragmatic approach is unlikely to yield the correct range of interpretations. At least something like C1 and P1 are needed.

5 The Variable Binding Approach

At this point, you may want to come back to the bound variable approach and see whether it does any better than the accommodation approach. Let's consider Roberts's modal subordination first.

Roberts [1987; 1989] noticed that discourses of the type in (31a) are problematic for DRT, since the reference marker introduced by the indefinite is not accessible to the pronoun "it" (under the interpretation consistent with there being no wolf around). Roberts argued that (31a) cannot be plausibly treated by assuming that the second sentence in (31a) is brought under the scope of the possibility operator as in (31b), since this would assign incorrect truth-conditions to (31a), i.e. it would predict that (31a) is synonymous with (31c).

(31) a. A_i wolf might come in. It_i would eat you first.

b. $\Diamond$ [x | WOLF(x), COME-IN(x), EAT-YOU-FIRST(x)]

c. A_i wolf might come in and eat you first.

One might object that this is not a conclusive argument against treating (31a) as a case of insertion (and thus of variable binding) as in (31b) since in (31b) we have simply ignored the modal "would". One might argue that if we don't ignore the "would", it is possible to assume that the pronoun is a bound variable and obtain correct truth-conditions. In DRT this would amount to assuming DRS (32) in place of (31b):

(32) $\Diamond$ [x | WOLF(x), COME-IN(x), $\Box$[EAT-YOU-FIRST(x)]]

Groenendijk and Stokhof [1990] could generate an equivalent formula by assuming that the possibility operator can extend its scope over the second sentence in (31a). In fact, we think there is some evidence in support of Roberts's contention that (31a) is not an instance of variable binding. Consider (33):

(33) a. A marmot may be inside. It would bite your hand.

b. It may be the case that a marmot is inside and would bite your hand.

Contrast (33) shows that the interpretation of the sentence in which the "would" is under the scope of a possibility operator differs from the interpretation of the corresponding sentence in which the "would" is not . Intuitively, under the epistemic reading of the possibility operator, the necessity operator requires an epistemic reading in (33b), but not in (33a). The difference may be seen clearly in (34), where it is explicitly indicated that the possibility operator should be understood epistemically:

(34) a. In view of what I believe, a marmot may be inside. It would bite your hand.

b. In view of what I believe, it may be the case that a marmot is inside and would bite your hand.

Thus, the revised version of the insertion approach still fails to get the truth-conditions right. This suggests that Roberts's missing antecedent approach is preferable: in this approach, the modal base of "would" may be fixed independently of the modal base of the possibility operator, since "would" is not in the scope of the possibility operator. Another way of putting the problem for the insertion approach is that although (35) is a theorem of S5,

(35) $\Diamond\Box q \rightarrow \Box q$

once we allow for different modal bases for "would" and "might," we are no longer in a position to derive "A wolf that came in would eat you first" from DRS in (32).

Now, let's return to the example of telescoping involving "no":

(15) No story$_i$ pleases these children. If it$_i$ is about animals they yawn, if it$_i$ is about witches they frown. If it$_i$ is about people they fall asleep.

Recall that Dynamic Quantifiers are capable of binding variables outside their scope and that dynamic operators do not freeze dynamic effects of formulae in their scope. To avoid predicting that the negation hidden in the meaning of the subject NP "no story" takes scope over the second sentence in (15), Groenendijk and Stokhof suggest that the choice of a translation for quantifiers is constrained by the following *monotonicity constraint*:

MC $\downarrow[\Phi;\Psi] \models \downarrow \Phi$

The constraint requires that "for any proper translation of a sentence Φ at the discourse level, it should hold that the truth-conditional content of Φ continued with Ψ is at least as strong as Φ itself." The intuitive motivation for the constraint is that in this way we require that

MC (English) no step in a discourse can constitute a weakening of the truth conditional content of the discourse up to that point

Intuitively, **MC** prevents negation in (15) from taking scope over the second sentence since this would result in the discourse being weaker than the first sentence. The monotonicity constraint proposed by Groenendijk and Stokhof is effective in requiring a choice of translation of the type in (36) for 'no' in (15):

(36) $\lambda P\lambda Q\mathcal{A}d_i[\hat{}P(d_i) \Rightarrow \uparrow\downarrow\sim\hat{}Q(d_i)]$

In this case, negation is prevented from taking scope over the second sentence in the discourse by the down arrow (assuming $\sim$ is dynamic negation, $\uparrow\downarrow\sim$ is its static counterpart.) The result is that discourse (15) is assigned a translation of the form in (37):

(37) $Ad_i[P \Rightarrow \uparrow\downarrow\sim\hat{}\,Q]; R$

The dynamic universal is able to bind the pronoun in the second sentence of the discourse, without generating incorrect truth-conditions. Consider however, example (28) again:

(28) No man$_i$ can be friends with a woman$_j$ he$_i$ finds attractive. He$_i$ always wants to have sex with her$_j$.

The indefinite "a woman he finds attractive" is translated as an existential by Groenendijk and Stokhof. If we adopt a translation of the type in (37), however, negation closes the existentially quantified formula and prevents "a woman" from anaphorically binding the pronoun "her" in the second sentence of the discourse. On the other hand, if we do not close negation off and we also assume that implication is dynamic in order to allow the existential "a woman" to bind the pronoun "her," then we predict incorrectly that (28) should have reading (38):

(38) if x is a man then it's not the case that (there is a y such that y is a woman that x finds attractive and y can be friends with x and x always wants to have sex with y.)

Thus, while the accommodation approach runs into the problem of explaining why accommodation happens in the way it does, the variable binding approach runs into an even more radical problem: it's hard to see how the correct truth-conditions for the telescoping cases and for the modal subordination cases could be derived in Groenendijk and Stokhof's DMG.[1] Finally, as we observed before, the variable binding approach yields no account of why telescoping of a pronoun in a simple sentence S should be limited to cases in which contextual information linking S to a restrictor is present.

We will now consider the cases of telescoping in sentences without explicit tripartite structures.

6 Telescoping Without Explicit Tripartite Structures

Scripts and Telescoping

Consider again the contrast between (6) (repeated as (39a)) and (1) (repeated as (39b)). The most obvious difference between the two sentences is that two different determiners are used— "every" is used in (39a), whereas "each" is used in (39b). But (39c) is not significantly better than (39b). We have seen, on the other hand, that when (39b) is read in the context provided by (40), (39b) becomes marginally acceptable.

[1]Dekker's [1990] revision of DMG assigns correct truth conditions to (28) by raising once more the type of the translation of sentences and redefining dynamic negation. An evaluation of Dekker's system requires more space than we have available.

(39) a. Each degree candidate$_i$ walked to the stage. He$_i$ took his diploma from the dean and returned to his$_i$ seat.

b. ??Every dog$_i$ came in. It$_i$ lay down under the table.

c. ??Each dog$_i$ came in. It$_i$ lay down under the table.

(40) I went to the circus last night. They had a number involving dogs that went like this: The circus performers put a table on some supports. Then, every dog came in. It lay down under the table, stood on its back paws, and lifted the table with its front paws.

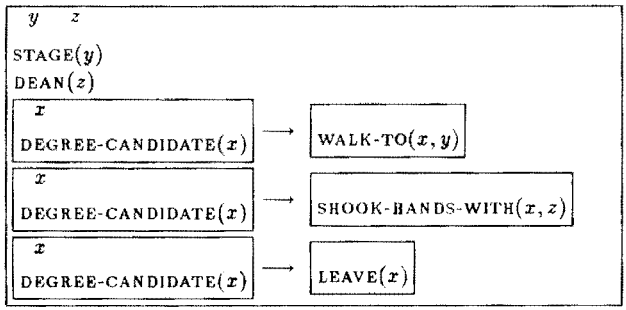
As said in section 3, (40) seems to support the hypothesis that telescoping becomes possible if the context makes it clear that what is being described is a routine performed by all the elements of the set quantified over. Until the routine is terminated, every sentence describing an event which is clearly part of the routine can contain a pronoun whose antecedent is the universally quantified NP. In cases like (39a), the routine may be already known to the reader: it is common knowledge that in graduation ceremonies a certain routine is required *of all the participants.*

Further support for this hypothesis comes from the fact that the more explicit the speaker is in signaling that a routine is being described, the easier telescoping becomes:

(41) Here is the procedure for the thesis defense. Every professor in the committee receives a copy of the thesis a month in advance. She writes down her comments and sends it back. ...

The simplest way to formalize this hypothesis, we believe, is to adopt the framework proposed in [Kamp, 1983; Kamp, 1990], in which the universal DRS is partitioned into a number of *articulated* DRS's. We will also assume, following [Kamp, 1983], that one of these articulated DRS's is used to represent those items which are in 'implicit focus'— i.e., those items which constitute 'background information' made salient by the discourse. For example, the discourse in (39a) causes a structure of the type in (42) to be added to the articulated DRS which contains the items in implicit focus, much in the same way that task structures are put in implicit focus in the dialogues observed by Grosz [1977]:

(42)

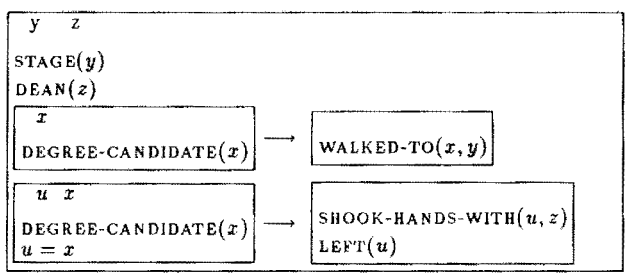


Let's call a DRS like (42) a *script*. (The steps of the script should be ordered, of course, but we want to keep the representation as simple as possible.) Let's also say that a script is *active* when it has been copied into the articulated DRS which represents the implicit focus. A sentence *instantiates* a step of a script if the predicate of its matrix clause is identical with the predicate of the consequent of the step. The rule invoked to reconstruct the logical form of the second sentence of (6) may then be informally described as follows:

> *Step Reconstruction*: If the script K is currently active, and if the current sentence S instantiates a step K′ of the script following the last one which has been instantiated, then
>
> 1. add to the root DRS the tripartite DRS K″ whose restrictor is identical to the restrictor of K′, and
> 2. add (the S-structure of) S to the nuclear scope of K″

The interpretation for (6) that we derive from this (much simplified!) rule is shown in (6′). The tripartite DRS associated with the anaphoric sentence has universal force. Its restrictor has been reconstructed in the manner described above, and its nuclear scope consists of the clause "He shook hands with the dean and left." The truth-conditions of (6′) can be paraphrased as "Each student walked to the stage. Each student shook hands with the dean and left."

(6′)



In order to develop this into a full-fledged account many more details should be added, of course. What is important, however, is that this account gives us the required universal force for the second sentence of (6).

E-type analysis

It has been proposed (by [Sells, 1985; Neale, 1990; Gawron *et al.*, 1991], among others) that the pronoun "he" in the second sentence of (39a) is an *e-type pronoun* [Evans, 1980; Parsons, 1978; Cooper, 1979]. We will follow here the presentation in [Neale, 1990]. The definition of e-type pronoun used by Neale is as follows:

(43) A pronoun P is E-type if is anaphoric on a quantifier Q that does not c-command P. [Neale, 1990]

The e-type hypothesis was motivated by examples like (44). Interpreting the pronoun "them" as bound by "Some sheep," as in (45), results in incorrect truth conditions. The problem with (45) is that it is true if Bill shaves just *some* of Harry's sheep. But intuitively, the truth of (44) requires Bill to shave *all* of Harry's sheep.

(44) Harry owns some sheep, and Bill shaves them. [Evans, 1980]

(45) [some x: sheep x](Harry owns x & Bill shaves x)

Because (46) is a more plausible paraphrase of (44), Evans proposed that the unbound pronoun "them" in (44) should be interpreted via the plural description 'the donkeys John bought', as in (47).

(46) Harry owns some sheep, and Bill shaves *the sheep Harry owns.*

(47) [some x: sheep x](Harry owns x) &
[the y: sheep y Harry owns y] (Bill shaves y)

The crucial property of e-type pronouns is *maximality*, defined by Neale as in (48):

(48) A quantifier '$[Dx : Fx]$' is *maximal* if and only if '$[Dx : Fx](Gx)$' entails '$[\forall x : Fx](Gx)$' for arbitrary G. ([Neale, 1990], p. 180)

The e-type approach appears to make the correct predictions for a number of cases of unbound anaphora, including cases in which the pronoun is singular, such as (49), or cases where the quantifier to which the pronoun is anaphoric is maximal, such as (50).

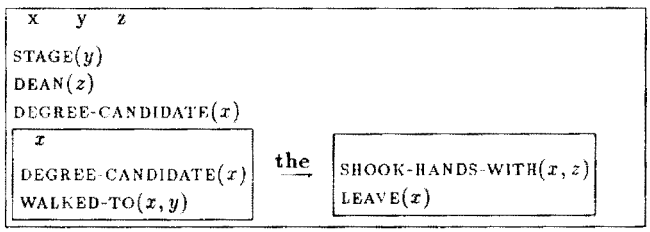
(49) *Just one man at my party* drank rum. *He* was ill afterward. [Neale, 1990]

(50) *The women who came at the party* were irritated by Bill; *they* complained, in particular, about his chauvinism. [Neale, 1990]

By claiming that the pronoun "he" in the second sentence of (6) is e-type, and assuming that the definite description operator 'the' is semantically equivalent to a universal quantifier with uniqueness restrictions, the e-type analysis assigns to (6) truth conditions that can be expressed in DRT by tripartite DRS (51) (in which we use a **the** operator with the same truth conditions as Neale's 'the'):

(6) Each degree candidate$_i$ walked to the stage. He$_i$ took his diploma from the dean and returned to his$_i$ seat.

(51)



First of all, let us note that (51) does obey the licensing condition we have proposed, and therefore would not represent, if correct, a counterexample to the main thesis of this paper. However, (51) is not a correct interpretation of (6). It suffers, in fact, ¿From the same problem that originally led Heim to give up the E-type account of donkey anaphora. In order for (51) to be true under the standard semantics for the definite description operator 'the' -- that Neale assumes– it must be the case that only one student walked to the stage, which is not, of course, what (6) means.

Do we have, then, a conclusive argument against an e-type analysis for (6)? A possible way out, put forward by Neale in [Neale, 1990], is that the pronoun *is* e-type, but that the definite description operator 'the' is not the appropriate operator. Neale assumes that pronouns may be translated as *semantically numberless* definite descriptions, represented using the new logical operator 'whe', defined as follows:

(52) '[whe x: F x](G x)' is true iff $|\ \mathbf{F} - \mathbf{G}\ | = 0$ and $|\ \mathbf{F}\ | \geq 1$

Moreover, he assumes that two translations are available for pronouns, one using 'whe', the other using the singular or plural version of the definite description operator. If the 'whe' operator is used as the translation of "the" in (51), we obtain the right truth conditions for that sentence. On the other hand, we are now unable to explain why (1)-(4) are bad.

(1) ??Every dog$_i$ came in. It lay down under the table.

(2) *If every cat$_i$ purrs, it$_i$ is happy.

(3) *If John owes every man$_i$ money then Sam pays him$_i$.

(4) *John likes every dog$_i$ and Sam feeds it$_i$.

According to Neale, this is just as it should be; (1)-(4) should be ruled out pragmatically:

> ...some people have argued that an adequate semantical theory must prevent pronouns from being interpreted as anaphoric on 'every' phrases that do not c-command them. In my opinion, this is a mistake. ([Neale, 1990], p.232)

Neale is not very explicit about the kind of pragmatic factors that could be involved, but it seems reasonable to assume that one of these pragmatic factors might very well be our knowledge about scripts— our common knowledge that certain events involve the execution of the steps of a routine by each element of a given set. It's hard to see which other pragmatic factors might be involved in explaining the constrast between (6) and (1).

So, it doesn't seem to us that adopting Neale's position would lead to a significantly different account of that contrast. Nor is it clear to us that the system obtained by supplementing Neale's 'numberless descriptions' proposal with pragmatic factors would assign to (5)-(8) different truth conditions from the system we have used in this paper. It thus appears that such a system would still satisfy the Licensing Condition we propose.

7 Conclusions, Additional Data

We have proposed that telescoping in (5)-(8) is possible because in all of these cases the sentence in which the telescoped pronoun occurs can be assigned a tripartite structure. We have seen how the implicit parts of the tripartite structure can be reconstructed, and proposed semantic constraints on the reconstruction process.

Below are more cases of unbound anaphora to quantified antecedents which we did not discuss in this paper:

(53) a. Every boy wants a dog_i. *Every mother loves it_i. (Gawron)

b. Every boy wants a dog_i. Every mother will always love it_i.

(54) Either there's no $bathroom_i$ in this house, or it_i's in a funny place. (Partee)

(55) Every man except John gave his $paycheck_i$ to his wife. John gave it_i to his mistress.
(Cooper's variation on Karttunen's theme, in [Chierchia, 1990])

(56) Usually John hires a black $limo_i$. However, today/sometimes it_i is blue. [Beaver, 1991]

(57) a. John has never ridden a $camel_i$. *And it_i stank.

b. John has never ridden a $camel_i$. But Bill has. And it_i stank. [Grinder and Postal, 1971]

Acknowledgments

We wish to thank Cleo Condoravdi, Mark Gawron, Janet Hitzeman, Makoto Kanazawa, Tracy King, Peter Lasersohn, Chris Manning, Geoff Nunberg, Chris Piñón, and Len Schubert for suggestions and grammaticality judgments. Massimo Poesio was supported by the Air Force-Rome Air Development Center Research contract no.F30602-91-C-0010.

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